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ABSTRACT

Children ranging in age from 1:1 to 1:3 were presented with 16 contrived lexical concepts, each consisting of a nonsense word (eight object words and eight action words) and four unfamiliar exemplars that served as the referents for that word. Overall, the children used 65% of the experimental words one or more times to refer to at least one of their respective exemplars. Children acquired a greater number of object words than action words. In addition, words that were consistent with the children's initial phonologies were acquired in greater numbers. With respect to these results, speed of acquisition paralleled number of words acquired. Data revealed no significant differences in the role played by functional vs. perceptual similarity between objects or actions. There appeared to be no relationship between performance of actions and later acquisition of object words: however, children acquired few action words for actions they did not perform. (JB)

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WORDS, OBJECTS, AND ACTIONS IN EARLY LEXICAL ACQUISITION

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In part, as a result of more recent interest in earlier periods of development, several proposals have emerged concerning the roles that various factors play in children's early acquisition of lexical concepts (Clark, 1973; Nelson, 1974; Anglin, 1977; Bowerman, 1977). However, a number of issues in lexical acquisition have yet to be resolved. The present inquiry involved an experimental examination of the roles of three such factors in early lexical acquisition: (1) the type of concept exemplars or referents involved (Objects vs. Actions); (2) the type of similarities among the exemplars of a concept (Functionally Similar vs. Perceptually Similar); and (3) the phonological characteristics of words relative to a child's existing phonology (In vs. Out).

For the most part, investigations of early word acquisition, such as those conducted by Nelson and Bonvillian (1973), have been limited to examinations of lexical concepts involving objects. In spite of this emphasis, there are some data that suggest differences in the acquisition of words referring to objects and words referring to actions. For instance, both Katherine Nelson (1973) and Benedict (1979) have reported that within children's first 50 words they produce a far greater number of object words than of action words. Additionally, Goldin-Meadow, Seligman and Gelman (1976) have observed that two-year olds do not begin to produce verbs until sometime after they have begun producing a number of nouns. Because of certain methodological limitations, particularly in the last of these studies, the findings should be considered somewhat tentative. Furthermore, some researchers have maintained that children's focus in early lexical acquisition is upon words for actions (Schank, 1972). Thus, the issue of differences in the acquisition of these two types of lexical concepts remains unresolved.

The second issue to be considered has arisen primarily from two theoretical proposals concerning the nature and progression of lexical acquisition. According to Eve Clark (1973), children form lexical concepts (i.e. use the same word to refer to various objects) and extend these concepts on the basis of shared perceptual

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attributes. These attributes are primarily static features such as shape, size, texture, and movement. Alternately, Nelson (1974) has argued that the dynamic functional relationships into which objects may enter are the primary basis for the formation of concepts. Perceptual attributes play an apparently minor role; they serve only as the basis for the recognition of new probable instances of an already formed concept. In a more recent paper Nelson and her co-workers (Nelson, Rescoria, Gruendel, and Benedict, 1978) maintained the argument for the primacy of functional relations but suggested that words attached to concepts at the outset or early in their formation should be applied to referents which are functionally similar. Later lexicalization of concepts should also be based upon functional similarities, but extended to perceptually similar instances. These proposals have yet to be examined experimentally at an early point in the acquisition of lexical concepts.

The final issue to be examined concerns the influence of phonological factors upon children's early word acquisition. A number of child phonologists (Ferguson & Farwell, 1975; Ingram, 1976; Menn, 1976) have observed that young children are selective in the words that they attempt. They appear to attempt words with certain phonological characteristics and avoid words with other characteristics following a variety of individual patterns. In spite of the influence which phonological selection and avoidance may have upon children's acquisition of a production lexicon, the phenomenon has been of far greater interest to investigators of phonological development.

The purpose of this investigation was an examination of these issues with an experimental paradigm.

METHOD

Twelve children, six males and six females, ranging in age from 1;1 to 1;3.15 at the outset, served as subjects. None of the children has evidenced usage of more than five "true" words based upon a definition adapted from Dore, Franklin, Miller and Ramer (1976), and Menn (1976). Additionally, all of the subjects came from middle class homes in which English was the only language spoken.

Each child was seen at home for an initial language sampling session and subsequently for ten bi-weekly experimental sessions over a period of approximately five months. The sample and a parental interview served as the bases for an analysis of each child's phonology and initial lexicon.

During the ten experimental sessions, the children were presented with 16 contrived lexical concepts, each consisting of a nonsense word (constructed individually for each child) and four unfamiliar exemplars which served as the referents for that word.

Based upon the initial sample the nonsense words were constructed so as to have the following characteristics. Half of the words had syllabic structures and were comprised of consonants which had not been evidenced in the child's productions or, where it could be determined, in attempted adult words. These experimental words were considered out of the child's phonological system. The remaining eight words had syllabic structures and were comprised of consonants which had been evidenced in the child's productions. These words were considered to be in the child's phonological system.

Eight of the concepts involved four unfamiliar objects, such as a nose clip, upon which an action was performed by the experimenter. The remaining concepts involved four unfamiliar actions performed by the experimenter upon more familiar objects such as pressing down on an object with an elbow or spinning an object with thumb and index finger. Within each of these groups of concepts, half involved exemplars which were functionally similar but perceptually different and half involved exemplars which were perceptually similar but functionally different. These concept types are represented as FS and PS respectively in the tables. The distribution of the concept types was as follows.

2 Action concepts with FS exemplars named by an OUT word
2 Action concepts with PS exemplars named by an OUT word
2 Action concepts with FS exemplars named by an IN word
2 Action concepts with PS exemplars named by an IN word
2 Object concepts with FS exemplars named by an OUT word
2 Object concepts with PS exemplars named by an OUT word
2 Object concepts with FS exemplars named by an IN word
2 Object concepts with PS exemplars named by an IN word

Objects which were perceptually similar shared static attributes, primarily shape and texture, and were functionally different in the actions that could be and were performed upon them. The presentation of these objects involved a different action for each of the exemplars within a given concept. Actions that were perceptually similar involved the same direction of movement and similar body parts. These exemplars were functionally different in terms of their end result or effect upon various objects.

Functionally similar objects were those upon which the same actions could be and were performed (e.g. spinning by hand). In presenting these objects the same action was performed upon each of the exemplars within a given concept. There were perceptual differences between the objects in terms of their shape and texture. Functionally similar actions were actions performed upon various familiar objects which had similar end results (e.g. making objects spin). These actions were perceptually different in the direction of movement and the specific body part involved.

During each of the sessions, all 64 experimental objects and actions were presented and named by the investigator. Since there was also a within concept frequency of presentation condition, two exemplars were presented twice in a session and two were presented once. Thus, over the course of the investigation the children heard each of the nonsense words applied to its various referents a total of 60 times. The order of presentation was random within the constraint that all of the exemplars within a concept were presented and named successively. The experimental words that were embedded in phrases such as "Here's an ofof, or Watch me kɛt," depending upon the type of exemplar involved. Following each presentation, the child was permitted to manipulate the experimental object or the familiar object upon which the experimental action had been performed. Finally, in every session a production probe to determine the acquisition of the experimental words was administered.

The data of interest were the children's spontaneous and elicited usage of the experimental words in reference to the appropriate exemplars. In order for a child's vocalization to be considered a production of an experimental word, certain phonetic characteristics were required. Minimally, the vowel or the consonant, if produced, had to match that of the experimental word or be consistent with commonly occurring phonological processes. The reliability of the identification of experimental word usage, when compared with the judgments of a second investigator for two sessions was 94 percent.

RESULTS

Overall, the children used 65 percent of the experimental words one or more times to refer to at least one of their respective exemplars. The first aspect of these data examined was the number of cases in which the children named one or more exemplars within each of the various concepts. An analysis of variance revealed that the children acquired a greater number of object words than action words ($F(1,11) = 31.45$ $P < .001$). Additionally,

words that were consistent with the children's initial phonologies were acquired in greater numbers than words which were inconsistent with their phonologies ($F(1,11) = 6.89$, $P < .025$).

The speed of acquisition of the experimental words was also examined. The mean numbers of presentations which occurred prior to the children's first spontaneous or elicited usage of the various words served as the basis for this determination. Since a prior analysis revealed no differences in the rate of initial lexicalization for perceptually-based and functionally-based concepts, the factor was collapsed. Analyses of variance revealed that the Object words were acquired with fewer prior presentations than Action words ($F(1,11) = 9.59$ $P < .05$ and that words consistent with the children's phonologies were acquired more rapidly than words that were inconsistent with their phonologies ($F(1,11) = 9.16$, $P < .05$).

The number of cases in which the children named two or more exemplars within a concept was also examined. In these cases, it can be inferred that the children had acquired lexical concepts in at least the sense that they were willing to apply a word to more than a single referent. Based upon a prior analysis which revealed no differences, the phonological factor was collapsed. A significantly greater number of object concepts were acquired than action concepts ($F(1,11) = 17.71$, $P < .001$). Although overall the children seemed to acquire more concepts based upon functional similarities than concepts based upon perceptual similarities, the difference was not significant ($F(1,11) = 3.46$ $P > .05$). Examination of the data for the individual children revealed that this trend was inconsistent. Thus, the children appeared to more readily acquire action as compared with object concepts, but there were no differences in their acquisition of functionally-based and perceptually-based concepts.

The findings for the speed of acquisition which were based upon the number of presentations preceding the child's naming of a second exemplar within a concept was as follows. Object concepts were acquired more rapidly than action concepts ($F(1,11) = 13.46$, $P < .005$) while the rate of acquisition of functionally-based and perceptually-based concepts did not differ ($F(1,11) = 1.03$, $P > .05$).

One additional aspect of the data was examined. For 85 percent of the object concepts, the children performed at least one of the demonstrated actions. There did not, however, appear to be a relationship between performance of these actions and later acquisition of object words. The children acquired

the words in all cases when they performed none of the relevant actions.

The pattern for action concepts was somewhat different. The children performed at least one of the experimental actions for 75 percent of these concepts. The children subsequently named only 42 percent of these concepts. Notably, the children acquired few words for actions which they did not perform. Although action performance does not assure lexical acquisition, it may prove to be a factor which facilitates the later production of action words.

Discussion

The results of this investigation directly address the three issues raised at the outset. First, the children more readily and more rapidly acquired words that were consistent with their phonologies as compared with words that were not consistent with their phonologies, providing experimental evidence for the phenomenon of phonological selection and avoidance. This finding however, has broader implications. Given the apparent influence of this selection factor, it seems critical that investigations of early lexical acquisition take such factors into account.

The findings also indicate that the children at this point in development more readily acquire object words and form object concepts as compared with action words and action concepts. It should be noted that the children's apparent lexical styles or orientations did not appear to influence these results. The findings support observations reported by Nelson (1973) and by Benedict (1979) which suggest that children's focus in the early acquisition of a production lexicon is upon object words. They contradict the position that action words dominate early word acquisition.

In the case of spontaneous productions of the object and action words the differences in acquisition may lie in the nature of the presentations themselves. Typically, actions were named after they were performed by the investigator. Thus, the child had to rely upon a mental representation of the exemplar. For the experimental objects though, the child had the advantage of the physical presence of the object. This difference, however, could not have been a factor in elicited productions. During the probes the names of actions were elicited while the investigator was performing the action.

The findings superficially appear to contradict the argument for the supremacy of action during this period of development. However, the frequency with which the children performed the experimental actions and the object-related actions argues strongly for its salience. An explanation of this finding may lie in the inherent differences between object words and action words. As Gentner (1978) has pointed out, object words specify things while action words specify relationships among things. Naming an action may therefore be a more demanding task than naming an object. At this stage, actions serve primarily as organizing principles and responses to language for the child while objects are the central focus of cognitive organization and lexical production. This seems consistent with aspects of Nelson's (1974) theoretical proposal and with recent findings reported by Benedict (1979).

The final aspect of the results to be discussed concerns the lack of significant differences in the children's acquisition of perceptually-based and functionally-based concepts. This finding argues against the notion that concepts constructed at this point in development and lexicalized early in their formation should involve functionally-based extension (Nelson et al., 1978). Since in this investigation the concepts were all novel and most were lexicalized fairly rapidly, it appears that concept formation as well as lexicalization at this point of development are equally likely to be based upon static perceptual attributes. This finding is not totally surprising since perceptual and functional attributes are often inextricably related. There is no reason to assume that children are not aware of both types of features. Furthermore, functional similarity among the exemplars of a concept usually requires at least a minimal degree of perceptual similarity.

The present investigation has served to further explicate the roles of three factors in early lexical acquisition; type of exemplar, the relationships among exemplars, and the phonological characteristics of words. The roles of other factors such as action will require additional analyses and further investigation before a complete understanding of early word acquisition is attained.

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